

REMARKS

Claims 1-16 are pending in the present Application. Claims 11-15 remain withdrawn, and no claims have been amended or canceled, leaving Claims 1-10 and 16 for consideration upon entry of the present response.

Please note that, where the instant Specification is referred to herein, citations are made with reference to the version of the Specification published as U.S. Patent Application Publication No. 2004/0115558 A1.

Applicants note that the Office action summary included with the present Office action dated September 24, 2007, does not list the claims under rejection or their disposition. Applicants further note that the Examiner has only listed Claims 1-10 as rejected in the body of the above-identified Office action, and has not addressed Claim 16. Applicants believe for reasons of record that Claim 16 should be allowable, particularly in view of the remarks below, but should the Examiner have a particular reason for rejecting Claim 16, Applicant's respectfully request the Examiner please so inform Applicants so that the appropriate arguments may be prepared.

Reconsideration and allowance of the claims are respectfully requested in view of the following remarks.

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-10 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,348,298 to Sakurai et al. ("Sakurai") in view of U.S. Patent Application Publication No. 2004/0048200 ("Ishibashi") and U.S. Patent No. 4,749,727 ("Tsuchiya"). It is noted that in the Office Action, the national origin of the cited references was omitted, but as the numbers correspond to the above US publications, Applicants have argued according to the disclosures of these US references. Applicants respectfully traverse this rejection.

Sakurai discloses a radiation sensitive composition comprising a colorant containing a quinacridone pigment, a mixture of an isoindolinone pigment and a yellow organic pigment, or a mixture of copper phthalocyanine blue and a green pigment, an alkali-soluble resin, a polyfunctional monomer and a photopolymerization initiator. Sakurai, Abstract. A reflection type color liquid crystal display device is formed using

this composition, having heat and light resistance, white balance, and for which spectral transmittance is optimized for the spectrum of surrounding light. Col. 2, lines 28-33. The radiation sensitive composition specifically includes the quinacridone pigment to achieve the desired performance. Col. 2, lines 37-40 and 66. Adhesion promoting agents (Additives) may be used, including 3-methacryloxypropyltrimethoxysilane. Col. 16, lines 1-3, 9, and 21. Sakurai discloses an organic acid additive used in an amount of 10 wt% or less, but does not disclose an amount of any further additives. Col. 15, lines 62-67. The additives are disclosed not to be essential ingredients. Col. 16, lines 31-33.

Ishibashi discloses a method of treating a photoresist film with a silicon or metal containing resist surface treatment. Abstract and p. 1, paragraph [0015]. The resist surface treatment is applied to the *top surface* of the photoresist film to form a resist surface treatment membrane, the object of which is to provide a top surface mask layer with dry etch resistance. See p. 1, paragraph [0015]; *emphasis added*. The resist surface treatment preferably includes water soluble silicone compounds, but in a variant of the method may also comprise silanes containing a reactive functional group, including 3-acryloxypropyltrimethoxysilane. See p. 10, paragraph [0185].

Tsuchiya discloses a process of preparing a three dimensional crosslinkable film forming resin composition. Abstract. The composition includes a silane compound grafted onto a film forming resin by irradiation with a radiation dose of 0.1 to 40 Mrad. Col. 2, lines 18-33. The silane compound can be 3-acryloxypropyltrimethoxysilane; however, preferred silane compounds have no oxygen bond positioned between the unsaturated group and the functional group and the alkoxysilane group for better water resistance and durability. Col. 5, line 11 and lines 18-25. The details of the grafting mechanism by irradiation are not clear. Col. 2, lines 33-35. The film forming resin can include carboxylic acids such as methacrylic and acrylic acids. Col. 3, lines 29-30. The silane compound can be used in an amount of 2 to 60 wt% corresponding to film forming resin in an amount of 40 to 98 wt%. Col. 3, lines 1-13. The composition is irradiated to form a sheet 0.1 to 50 mm thick, where the thickness is determined depending on a range of the radiation (i.e., e-beam). Col. 3, lines 41-47.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior

art relied upon, or knowledge generally available in the art at the time of the invention, must provide some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). The obviousness inquiry also requires consideration of common knowledge and common sense. *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1742-43 (2007); *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006) (“Our suggestion test is in actuality quite flexible and not only permits, but requires, consideration of common knowledge and common sense.”)

Disclosed in the instant specification and claimed in the instant claims is a photosensitive resin composition for use in a color filter of different thicknesses. To form such a color filter, the hardness of the color filter must be different in each of the strata of the color filter film, i.e., in each of the upper, middle, and lower layers of the color filter, for the following reasons.

Specifically, in the upper layer of the color filter, oxygen present in the surrounding air can react with the activated photopolymerization initiators, in a way that interrupts the initiation reaction of the photoinitiator, which in turn reduces hardness of the upper layer and increases solubility of this layer in a developing solution. However, the photopolymerization initiators in the lower and middle layers, which are a further distance from the atmosphere such that oxygen diffusion, which can lead to adverse interaction with the activated photopolymerization initiator, is significantly reduced. In this way initiating of the crosslinking and interconnection of co-reacting groups provides hardness to the middle and lower layers of the color filter. 3-

acryloxypropyltrimethoxysilane has been found to advantageously increase hardness of the lower layer of the color filter through chemical bonding of the organic composition and the substrate, leading to a solubility difference between the upper, middle, and lower layers of the color filter.

Accordingly, the photosensitive resin composition, when formed into a film, has the effect of providing a gradual difference in thickness during development when the

photosensitive resin composition comprises both a photopolymerization initiator and 3-acryloxypropyltrimethoxysilane, and has been shown only where 3-acryloxypropyltrimethoxysilane and photopolymerization initiators as disclosed in the instant Specification are used together. None of the cited references disclose the use of photopolymerization initiators and 3-acryloxypropyltrimethoxysilane together.

Further, instant Claim 1 recites the limitations that the photosensitive resin composition for a color filter comprises “0.1 to 2 wt% of 3-acryloxypropyltrimethoxysilane as a lower layer silane hardener”. This content of 3-acryloxypropyltrimethoxysilane is not disclosed in either Tsuchiya or Ishibashi.

Applicants therefore respectfully assert that instant independent Claim 1 is patentable over Sakurai because the reference fails to teach or suggest all the limitations of Claim 1, fails to provide a suggestion or incentive that would motivate one skilled in the art to modify the reference to provide the invention as claimed in the instant claims, or that so modifying the reference would fail to provide a reasonable expectation of success for the combination.

In particular, neither Ishibashi nor Tsuchiya remedies the deficiencies of Sakurai, which does not disclose or teach 3-acryloxypropyltrimethoxysilane. Neither Ishibashi nor Tsuchiya teaches that any of the adhesion promoters of Sakurai are equivalent to 3-acryloxypropyltrimethoxysilane in an amount of 0.1 to 2 wt% because neither provides a suggestion or incentive that would motivate one skilled in the art to use the claimed lower layer hardener 3-acryloxypropyltrimethoxysilane in an amount of 0.1 to 2 wt%, specifically where it is required that the resulting composition provide acceptable lower layer hardening, and a specific film thickness as a function of exposure energy (γ -value).

As discussed hereinabove, Sakurai fails to disclose an amount of silane adhesion promoter. Ishibashi discloses only exemplary embodiments in which the siloxanes (water soluble siloxanes) which are present in amounts of about 5-8 wt% in the resist surface treatment composition. Ishibashi, e.g., p. 10, paragraph [0170]-[0177]. Ishibashi thus fails to disclose an amount of silicon compound (specifically 3-acryloxypropyltrimethoxysilane) in the range claimed in Claim 1 of 0.1 to 2 wt%. Further, the resist surface treatment composition disclosed in Ishibashi does not include all components as claimed in Claim 1. One skilled in the art will appreciate that the method disclosed in Ishibashi is that of a

surface modification method to create a bilayer-type imaging pattern, with the topmost (patterned) surface of the photoresist having a high etch resistance to dry etch conditions as conveyed by application of the resist surface treatment composition, and is not at all analogous to the composition disclosed in Sakurai, or to the composition for a color filter resist claimed in the instant claims. As disclosed in Ishibashi, the photoresist is applied first to a substrate and formed into a film, and may be imaged. In a subsequent step, the resist surface treatment is applied, and thus resist surface treatment composition of Ishibashi does not comprise the base soluble resin (a component of a photoresist) nor a pigment. Thus, the methods of application disclosed in Sakurai and Ishibashi differ, and is of necessity in Ishibashi a two step process in contrast to the single composition of Sakurai; Ishibashi thus provides a two layer film constructed of discrete, separately applied layers, unlike that disclosed in Sakurai or in the instant claims. Thus, Ishibashi fails to remedy the deficiencies of Sakurai, and the combination does not disclose all elements of the invention.

Sakurai also clearly discloses a specific composition for use in a reflection type color liquid crystal display device, and that such device requires a quinacridone pigment. Sakurai, Col. 2, lines 28-33. There is in Sakurai or Ishibashi no teaching that would lead one skilled in the art to modify either one with the other, as the resist surface treatment of Ishibashi are completely dissimilar and share no feature in common with the composition and application of Sakurai for preparing a reflection type color liquid crystal display that would suggest the combination.

Further, there is no incentive to further combine Sakurai and Ishibashi with Tsuchiya. Tsuchiya discloses a composition that is used to prepare a single layer film having a graft polymer with ethylenically unsaturated alkoxy silane groups. The film forming resin composition disclosed therein is mixture of a film forming resin, silane compound, an organic solvent and/or a polymerizable unsaturated monomer; and the film forming resin composition *consisting essentially of* the silane modified resin prepared therefrom is diluted in an organic solvent and can further have various additives including pigments included therein. Col. 5, lines 41-51. No quantity of pigment is disclosed, nor is a photopolymerization initiator disclosed, as is claimed in Claim 1, and thus Tsuchiya fails to disclose all elements of the instant claims. The inclusion of a photopolymerization

initiator as disclosed in Sakurai as an inventive element precludes the combination with Tsuchiya.

Further, Tsuchiya discloses only that the silane-modified resin is present in an amount of 2 to 60wt% relative to the film forming resin, but provides no teaching or disclosure that would induce one skilled in the art to combine the silicone composition with the composition of Sakurai to provide a composition that reads on the photosensitive resin of instant Claim 1; and that the reason for inclusion of the silane compound is to provide a radiation curable composition that can form a film of 0.1 to 50 mm thick. Bi-level imaging as claimed is not taught or disclosed in Tsuchiya or Sakurai, or Ishibashi. For these reason Tsuchiya further provides no incentive to combine with Sakurai, as Tsuchiya fails to provide a motivation for combining either a radiation curable film composition with a quinacridone containing composition used to prepare a reflection type color liquid crystal display device having heat and light resistance, white balance, and for which spectral transmittance is optimized for the spectrum of surrounding light. Col. 2, lines 28-33; Col. 2, lines 37-40 and 66. Sakurai further teaches that other pigments may be combined with the quinacridone such that the combination does not impair the desired effects, and thus discourages further modification. Sakurai, Col. 5, lines 50-53. Tsuchiya discloses inclusion of other pigments, but does not disclose any amount for the additional pigments. In view of the need to maintain an amount of pigment, additives, and other components such that the desirable qualities of the composition as a reflective-type color display device composition are not interfered with, Tsuchiya does not suggest combination with Sakurai, nor does Sakurai suggest combination with the radiation crosslinkable, graft-copolymer forming composition of Tsuchiya. Tsuchiya provides no teaching or suggestion that would lead one skilled in the art to combine it with Ishibashi, as the compositions as discussed above are completely unlike each other.

The courts have held that “[i]f the proposed modification would render the prior art invention being modified unsatisfactorily for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon* 733 F. 2d 900, 221 USPQ 1125 (Fed. Cir. 1984). The courts have held that “[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render

the claims prima facie obvious.” *In re Ratti* 270 F. 2d 810, 123 USPQ 349 (CCPA 1959). Based on the specificity of the teachings of Sakurai (which requires a quinacridone pigment and discretion for including other components) and Tsuchiya (which discloses a film forming resin composition consisting essentially of silane compound, film forming resin, and optionally solvent), one skilled in the art would have reason to believe that combining these disclosures would adversely affect at least the properties of the inventions of Sakurai and Tsuchiya, if not both. Thus, no suggestion to combine these references exists.

Further, even assuming that all elements of an invention are disclosed in the prior art, an Examiner cannot establish obviousness by locating references that describe various aspects of a patent applicant’s invention without also providing evidence of the motivating force which would have impelled one skilled in the art to do what the patent applicant has done. *Ex parte Levengood*, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. Int. 1993). The references, when viewed by themselves and not in retrospect, must suggest the invention. *In Re Skoll*, 187 U.S.P.Q. 481 (C.C.P.A. 1975). In particular, in failing to teach or disclose the limitation of the amount of lower layer hardener, and as argued previously over Sakurai in the Response filed July 6, 2007, Sakurai in view of Ishibashi and Tsuchiya fails to account for the specific need for such a limitation as amply expressed in the instant Specification of the present invention. As disclosed in the instant Specification, “The content of the lower layer hardener (3-acryloxypropyltrimethoxysilane) is preferably 0.1 to 2wt% of the entire photosensitive resin composition. If the content is below 0.1wt%, pattern breakup occurs due to low hardness of the lower layer and poor adhesion to the substrate. Otherwise, if it exceeds 2wt%, residue may remain because the developing rate of the unexposed portion becomes very low.” See Specification, p. 3, ¶ [0042]. Also as disclosed in the instant Specification, the role of the lower layer hardener is to increase the hardness of the lower level of the film to provide a solubility difference between the upper, middle, and lower layers of the film (cast as a single film in a single step), which in turn provides a graduated difference in film thickness during development. See Specification, p. 4, ¶ [0052]. Further, it is disclosed in the instant Specification that the composition is invulnerable to film breakup during developing without rapid thickness reduction, and accordingly film thickness as a function of exposure energy (γ -value) decreases, allowing control of the

thickness of the double layer structure. See Specification, p. 4, ¶ [0053]. Sakurai fails to disclose or demonstrate a formulation that, in the absence of the specific teaching of an amount of lower layer hardener, would provide a photoresist that would have the desired level of dissolution control as found in the photosensitive resin composition of instant Claim 1 and its dependents. Ishibashi discloses a second coating step to form an additional layer on an already-formed photoresist film. Tsuchiya discloses a composition for providing a radiation curable composition to prepare films of 0.1 to 50 mm thickness, but does not disclose lower layer hardening.

The disclosure of the present invention is directed to the prevention of defects (film breakup) during development of the photosensitive resin film by use of an improved photosensitive resin composition with a specific additive included in a specific amount in order to achieve this particular performance. Sakurai, alone or in combination with Ishibashi and Tsuchiya, however, fails to provide a teaching or disclosure of either the specific amount of adhesion promoter, of or a particular type of adhesion promoter that would provide the gamma value performance as claimed in the instant claims, and thereby the combination fails to provide a suggestion or incentive that would motivate one skilled in the art to modify Sakurai with Ishibashi and Tsuchiya to address the particular problem at hand of eliminating pattern breakup under the processing conditions disclosed in the instant Specification, and for which the photosensitive resin composition claimed in instant Claim 1 has been arrived at by Applicants.

One skilled in the art of photoresist formulation and processing will readily appreciate that even seemingly minor differences in photoresist composition (e.g., type and amount of an additive) can have a profound effect on the performance of a photoresist composition used under specific conditions, and that therefore such seemingly minor differences are in reality not minor at all, as illustrated by the performance of the claimed photosensitive resin composition as found in Examples 1, 4, and 5 of the instant Specification. See Specification, p. 6, Table 3.

In the Examples of the instant Specification, Comparative Examples 1 and 3 without added lower layer hardener (γ values of 3.4 and 4.0, respectively) or Comparative Example 2 with a hardener included (γ value of 3.5) clearly show that an arguably equivalent composition as taught in Sakurai, and exemplified by these comparative

examples, do not meet the claimed performance requirements absent the particular, specified combination of lower layer hardener (3-acryloxypropyltrimethoxysilane) and amount (0.1-2 wt%) thereof. See Specification, p. 6, Table 3. Specifically, Table 3 shows that the use of a lower layer hardener in an amount of 0.1 to 2 wt% unexpectedly produces desirably low developing γ -value of 0.1-2.5 (1.3, 0.8, and 1.1 for Examples 1, 4, and 5, respectively), and that either a different lower layer hardener or a different amount of lower layer hardener than as instantly claimed (Comparative Examples 1-3 as discussed above) produces a larger γ -value (greater than 2.5), which is undesirable. Applicants thus respectfully maintain their earlier assertion that the invention is not obvious at least because the particular combination of claimed elements results in unexpectedly beneficial properties, and the reference fails to teach the particular combination of claimed elements.

There is no teaching or disclosure of 3-acryloxypropyltrimethoxysilane in an amount in Sakurai or its combination with Ishibashi and Tsuchiya that corresponds to the claimed amount of 0.1 to 2 wt% of lower layer hardener in Claim 1, and consequently, Sakurai in combination with Ishibashi and Tsuchiya cannot fairly be said to disclose this amount. Nor, in view of the unexpected results achieved by the use of this particular amount of lower layer hardener as described in the previously file Response file on July, 7, 2007, and having the above-describe performance boundaries below 0.1 wt% and above 2 wt% of added lower layer hardener, would it be obvious to expect the outcome of adding a random amount of a lower layer hardener in the absence of such guidance as to the amount thereof.

Sakurai in view of Ishibashi and Tsuchiya thereby fails to teach, suggest, disclose 3-acryloxypropyltrimethoxysilane in the claimed amount of 0.1 to 2 wt%; and does not provide a suggestion or incentive that would motivate one skilled in the art to use the claimed lower layer hardener in an amount of 0.1 to 2 wt%, and for these reasons fails to provide a reasonable expectation that Sakurai would as disclosed provide the claimed gamma value performance of instant Claim 1 as demonstrated by the Examples and Comparative Examples disclosed in the instant Specification for the claimed photosensitive resin composition.

In addition, Applicants believe the Examiner has misunderstood the scope of the invention claimed in the instant claims and disclosed in the instant specification.

The references in combination thus do not teach all limitations of the instant claims, does not provide a suggestion or incentive for modifying the reference to provide the desired result, and does not therefore provide a reasonable expectation that the desired result would be obtained. Sakurai therefore cannot render the instant claims unpatentable, and as such, Applicants respectfully submit that independent Claim 1, and its dependent Claims 2-10 are patentable over Sakurai in view of Ishibashi and Tsuchiya. Further, though no specific rejection has been advanced, in view of the above arguments, Claim 16 should also be allowable in view of the above remarks. Reconsideration and withdrawal of this rejection are respectfully requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and withdrawal of the rejections and allowance of the case are respectfully requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

CANTOR COLBURN LLP

By: /Dana A. Gronbeck/
Dana A. Gronbeck
Registration No. 55,226
Confirmation No. 5598
Cantor Colburn LLP
20 Church Street, 22nd Floor
Hartford, CT 06103
PTO Customer No. 23413
Telephone: (860) 286-2929
Fax: (860) 286-0115

Date: February 25, 2008